

CLAIMS

1. A laser-clad processing apparatus for carrying out laser-clad processing onto a valve-seat portion of a cylinder head, the laser-clad processing apparatus being characterized in that it comprises:

cylinder-head holding means for holding the cylinder head in an inclining manner so that the central axial line of said valve seat becomes the vertical direction;

a laser-processing head for irradiating a laser beam onto a process part of said valve seat, and at the same time discharging a powdery material to the process part;

rotary means which rotates around the central axial line of said valve seat in such a state that said laser-processing head is inclined with respect to said vertical direction; and

powdery-material supply means for supplying the powdery material to said laser-processing head.

2. The laser-clad processing apparatus set forth in claim 1, wherein said cylinder-head holding means is equipped with: inclination means for inclining the cylinder head between two positions, a first position at which the central axial line of an inlet valve seat becomes parallel to the vertical line and a second position at which the central axial line of an outlet valve seat becomes parallel to the vertical line; and horizontal-movement means for moving the cylinder head in the X-axis direction and in the Y-axis direction, which crosses with the X-axis direction perpendicularly, on a horizontal plane.

3. The laser-clad processing apparatus set forth in claim 1, wherein the laser-processing head comprises: laser-beam generation means for generating said laser beam; and a coaxial nozzle through which the laser beam passes and at the same time which discharges said powdery material.

4. The laser-clad processing apparatus set forth in claim 3, wherein said laser-beam generation means is such that a plurality of laser diode arrays are disposed, and shapes said laser beam by controlling the laser diode arrays depending on the width direction of said valve-seat portion.

5. The laser-clad processing apparatus set forth in claim 1, wherein said powdery-material supply means, while letting said powdery material flow to a predetermined flow-out opening, lets flow it out through the flow-out opening by means of carrier-gas pressure, thereby compressively supplying it to said laser-processing head.

6. A laser-clad processing method for carrying out laser-clad processing onto a valve-seat portion of a cylinder head, the laser-clad processing method being characterized in that it comprises:

holding the cylinder head in an inclining manner so that the central axial line of said valve seat becomes the vertical direction; supplying a powdery material along said valve-seat portion while holding a laser-processing head in an inclined manner with respect to the vertical direction and rotating it around the central axial

line of said valve seat; and at the same time irradiating a laser beam to carry out laser-clad processing.

7. The laser-clad processing method set forth in claim 6, wherein the shape of said laser beam is a rectangular shape.

8. The laser-clad processing method set forth in claim 6, wherein said laser-processing head is rotated normally and is rotated reversely along said valve-seat portion.

9. The laser-clad processing method set forth in claim 6, wherein said powdery material is discharged so as to deposit concentratedly within a circle whose diameter is adapted to a side of said rectangular-shaped laser beam, the side crossing with the processing development direction perpendicularly.

10. The laser-clad processing method set forth in claim 6, wherein the powder material is melted by irradiating said laser beam behind the deposition center of said powdery material by a predetermined distance with respect to the development direction of laser processing.

11. The laser-clad processing method set forth in claim 6, wherein, when stopping the compressive supply of said powdery material, the flow of said powder material is stopped, and said pressure by means of carrier gas is lowered toward a predetermined value while taking a predetermined time since the time at the flow stoppage or immediately before the flow stoppage.

12. The laser-clad processing method set forth in claim 6, wherein: before compressively supplying said powdery material, the flow volume of said carrier gas is increased; immediately before starting the flow of said powdery material, it is decreased to a steady flow volume; and immediately before the flow stoppage, the carrier gas is opened to air.